Fall 9-1-2001

SCI 225.01: General Physcial and Chemical Science

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Science 225 GENERAL PHYSICAL AND CHEMICAL SCIENCE Autumn, 2001

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Deborah McArthur, Office – JRH M4, E-mail: muddebz@yahoo.com

INTERNET SITE: www.physics.umt.edu/sci225
LECTURES: 3 one hour lectures/week, MWF at NOON, SC 131
DISCUSSION/LABORATORY PERIODS: 2 two hour sessions/week, Tu,W in SC 13, Th,F in SC 225

MAIN REFERENCE: CONCEPTUAL PHYSICAL SCIENCE by Hewitt, Suchocki and Hewitt

GRADING:
EXAMS: Exams 1, 2, and 3 (15% each) 45%
FINAL EXAM: Friday, Dec. 21st, 8:00 am 20%
LAB NOTEBOOK: 15%
PROJECT PRESENTATIONS: 10%
WEEKLY ASSIGNMENTS 10%

COURSE OUTLINE AND SCHEDULE:

Week 1: Sept. 4 - Sept. 7 (Monday, Sept. 3 - **HOLIDAY**, Labor Day)
LECTURES: Overview: Matter and Energy
DISCUSSION: Introductions, course policies
LAB: Lab 1: Math and Graph Review
READING: Prologue (pages 1-10), Appendix A (pages 748 -750), Chapter 15 (pages 362-376)

Week 2: Sept. 10 - 14
LECTURES: Motion, forces, and mechanical energy
DISCUSSION: Discussion on the scientific process; collecting and presenting data
LAB: Lab 2: Measurements and Determining Density Changes in Solids and Liquids
READING: Chapter 1 (pages 12-26), Chapter 2 (pages 30-48), Chapter 3 (pages 60-71)

Week 3: Sept. 17 - 21
LECTURES: Gravity and gravitational energy
DISCUSSION: Demonstrations and problems concerning forces and motion
LAB: Lab 3: Determination of Gravitational Acceleration
READING: Chapter 4 (pages 76-94)

Week 4: Sept. 24 - 28 (Friday, Sept. 28 - **EXAM 1**)
LECTURES: Electricity, magnetism, and electromagnetic energy
DISCUSSION: Practice exam and electricity/magnetism demonstrations
LAB: Lab 4: Electric Circuits - Using Light Bulbs as Resistors
READING: Chapter 8 (pages 184-205), Chapter 9 (pages 211-225)

Week 5: Oct. 1 - 5
LECTURES: Light, the electromagnetic spectrum, and other wave energy
DISCUSSION: Demonstrations and applications of waves
LAB: Lab 5: Lenses and Image Formation
READING: Chapter 10 (pages 232-249), Chapter 11 (pages 258-281), Chapter 12 (pages 285-307)

Week 6: Oct. 8 - 12

LECTURES: Thermodynamics, thermal energy and heat
DISCUSSION: Optics and energy conversion problems
LAB: Lab 6: Heat Measurements and Studying the Heat Capacities of Solids: Calorimetry
READING: Chapter 6 (pages 134-155), Chapter 7 (pages 159-178)

Week 7: Oct. 15 - 19
LECTURES: Atomic structure and radioactivity
DISCUSSION: Lab 7: Radioactivity Simulation and Measuring Half-Life
LAB: **FIRST STUDENT PROJECT PRESENTATIONS**
READING: Chapter 13 (pages 314-328) and Chapter 14 (pages 332-345)

Week 8: Oct. 22 - 26 (Friday, Oct. 26 - **EXAM 2**)
LECTURES: The elements and the Periodic Table
DISCUSSION: Practice exam
LAB: Lab 8: Atomic Spectra
READING: Chapter 16 (pages 380-400)

Week 9: Oct. 29 – Nov. 2
LECTURES: Chemical bonds and building molecules
DISCUSSION: Chemical compounds and structure of molecules
LAB: Lab 9: Acid-base Chemical Reactions and Antacids
READING: Chapter 17 (pages 404-420) and Chapter 20 (pages 472-480)

Week 10: Nov. 5 - 9 (Monday, Nov. 12 - **HOLIDAY,** Veteran's Day)
LECTURES: Molecular interactions and mixing; chemical reactions
DISCUSSION: Molecular interactions and chemical equations practice exercises
LAB: Lab 10: Separation and Purification of Substances by Chromatography
READING: Chapter 18 (pages 424-435, 440-445) and Chapter 19 (pages 449-452)

Week 11: Nov. 12 - 16 (Friday, Nov. 16 - **EXAM 3**)
LECTURES: Chemical reactions and energy
DISCUSSION: Practice Exam
LAB: Lab 11: Introduction to Chemical Reactions
READING: Chapter 19 (pages 452-456, 463-466) and Chapter 20 (pages 486-487, 494-496)

Week 12: Nov. 19 (Nov. 21 - 23, **THANKSGIVING HOLIDAY)**
LECTURES: Overview of the solar system
DISCUSSION: **NO** sessions this week
LAB: **NO** sessions this week
READING: Chapter 28 (pages 684-690)

Week 13: Nov. 26 – 30
LECTURES: The solar system
DISCUSSION: Planetarium; Lab 12, Part I: Exploring the Night Sky
LAB: Lab 12, Part II: Making Models of the Solar System: Comparative Planetology
READING: Chapter 28 (pages 691-703)

Week 14: Dec. 3 - 7
LECTURES: Nature and evolution of the stars
DISCUSSION: Star charts; Star Probe
LAB: Lab 13: The Relationship Between Brightness and Distance
READING: Chapter 29 (pages 706-722)

Week 15: Dec. 10 - 14
LECTURES: Evolution of the Universe
DISCUSSION: **SECOND STUDENT PROJECT PRESENTATIONS**

LAB: Final practice exam and review
READING: Chapter 30 (pages 724-744)

FINAL EXAM: Friday, Dec. 21st, 8:00 a.m. – 10:00 a.m.

Instructors' Offices and Office Hours: e-mail address:

Diane Friend (SC 129), dsfriend@selway.umt.edu
Mon. 9-10, Tues. noon-1, Wed. 4-5, Thurs. 3-4, Fri. 1-2

David Freeman (PhP 235), dfreeman@selway.umt.edu
to be announced . . .

Brian Boer (SC 317), boerbrian@hotmail.com
Tues. noon-1, Wed. 9-10

Matthew Fitzpatrick (JRH M4), fitzpatrick0710@msn.com
Mon. 1:30-2:30, Wed. 8-9

Deborah McArthur (JRH M4), muddebz@yahoo.com
Mon. 1-2, Wed. 11-noon

Course Policies:

1. Exams must be taken at the scheduled times unless a make-up time is arranged **BEFORE** the exam.
2. Homework assignments are due at the date and time specified. Late assignments will not be graded.
3. Lab notebooks will be collected and graded at periodic intervals throughout the semester (probably about four times). Your T.A. will give you at least one weeks notice before each collection date. Late notebooks will not be graded.
4. The presentation projects are **MANDATORY**. You cannot pass the course without doing **BOTH** projects.
5. You cannot switch discussion or lab sections without **PRIOR** permission.
6. We expect you to attend the discussion sections, and we will take attendance. More than **TWO** (excused or unexcused) absences will **DROP YOUR FINAL GRADE** by one letter (except for unusual circumstances). More than **FOUR** absences will **DROP YOUR FINAL GRADE** by two letters.
7. You must attend the lab sessions in order to write and submit lab reports. Attendance will be taken.
8. For excused absences from discussion or lab sections, notification by phone, e-mail, etc. **MUST** be given **BEFORE** the section begins.
9. Excused lab absences can be made up at the discretion of the instructors. If the equipment or materials available for that lab are no longer available, another lab may have to be substituted.
10. The **GRADING SYSTEM** for this course is based on your total percentage determined from your scores on the three midterm exams, the final exam, your two project presentation scores, your lab report scores, and your weekly assignments. These scores are weighted according to the percentages listed on the course outline. Based on grades from the last few years, you will probably need to get in the upper 80s to get an A, the upper 70s to get a B, and the upper 60s to get a C. Each lab instructor will tell you how the lab reports should be written and how they will be graded.